

# Laparoscopy Between the World Wars: The Barriers to Trans-Atlantic Exchange

Spotlighting Heinz Kalk and John C. Ruddock

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## Kalk's Initial Experiences with Laparoscopy

Heinz Kalk (1895-1973) of Frankfurt am Main was a young medical student in 1914 when he reported to the recruitment center for service in the German army.<sup>1</sup> Kalk served four years as an artillery officer on the Western Front, and was wounded in 1918.

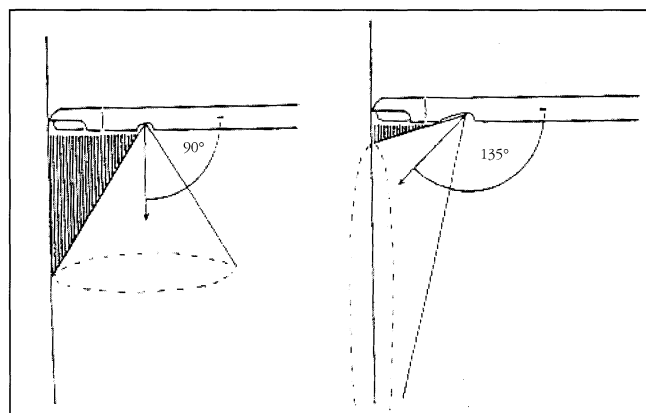
Kalk continued his studies after the first world war and passed the medical examination in 1921. In 1927, he was chosen to be a senior physician under Bergmann at the Charite Hospital in Berlin.<sup>2</sup> Kalk was probably unfamiliar with Kelling's and Jacobaeus' work when he first became interested in laparoscopy.<sup>3</sup> He performed his initial experiments in laparoscopy with a cystoscope inserted through the abdominal wall via a scalpel incision.

In 1928, Kalk asked the Heynemann Company to construct a scope to be used expressly for laparoscopy which utilized a 135-degree optical system. He also designed a 6 mm trocar along with other necessary instruments to perform laparoscopic procedures (**Figures 1, 2**). Pneumoperitoneum was created by injecting room air into the abdominal cavity using a large syringe. In 1929, Kalk's 42 page publication on abdominal endoscopy (laparoscopy) appeared in a German medical journal. His debt to Jacobaeus' 1912 monograph, however, became clear, as he adopted the terms "laparoscopy" for the procedure and "laparothoracoscopy" for his instrument.

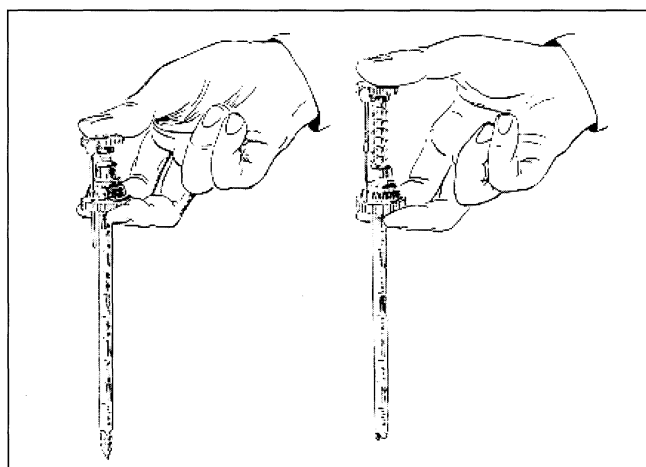
During the ensuing years, Kalk, a surgeon, devoted most of his efforts to laparoscopic study of the liver. He never became interested in the diagnostic use of laparoscopy for evaluating other abdominal diseases, reasoning that physicians should rely instead on gastroscopy or radiological diagnosis.

## Ruddock's First Experiences with Laparoscopy

After the first World War, and about the same time, the American internist John C. Ruddock (1891-1964) left the United States Navy to enter private practice in Los Angeles. However Ruddock concentrated on cardiology in the 1920s. He was an active member of the American College of Cardiology and, in 1931, became president of the California Heart Association.<sup>4</sup>



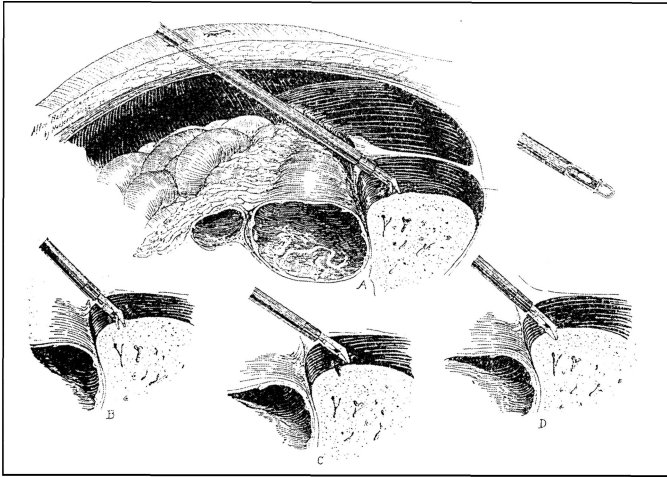
**Figure 1. Left: 90-degree lens system (Jacobaeus, 1910). Right: 135-degree laparoscope (Kalk, 1929). Figure 3-4 in *Highlights in the History of Laparoscopy*.**



**Figure 2. Kalk's trocar for laparoscopy. Figure 3-13 in *Highlights in the History of Laparoscopy*.**

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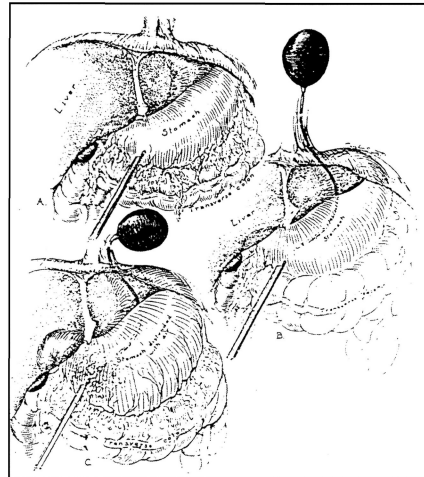
**Figure 3. Peritoneoscopic biopsy (Ruddock, 1934).**  
Figure 3-6 in *Highlights in the History of Laparoscopy*.

According to one of his assistants, Irving Wills of Santa Barbara, Ruddock used the McCarthy cystoscope at the beginning of his laparoscopic efforts. Wills noted, "It was really quite amazing to me how much one could see with that rather limited instrument. It had a small telescope, too short, and there were many other difficulties..."<sup>5</sup> An incision was necessary to insert the instrument into the abdominal cavity and stitching was required to keep it tightly fixed and prevent the loss of pneumoperitoneum. Ruddock added a trocar quite early to his peritoneoscopy set so that proper access could be gained to the abdominal cavity.

Ruddock presented his peritoneoscope for the first time in 1934. The term "peritoneoscopy" was initially proposed by Orndoff of Chicago in 1920.<sup>6</sup> Ruddock's instrument consisted of a fluid evacuator equipped with an air-tight lock, a pneumoperitoneum needle, sheath and bistoury-tipped obturator which acted as a trocar, "Telescope" (14-inch, preoblique optic), and biopsy forceps.<sup>7</sup>

Ruddock "borrowed" the idea of combining biopsy forceps with a peritoneoscope from urologists. He successfully obtained specimens from numerous solid organs, including the liver, spleen, stomach, omentum, and peritoneal surfaces. Ruddock coagulated all wounds, regardless of whether they were bleeding or not (**Figure 3**).

In contrast to Kalk, Ruddock devoted a great deal of attention to the topic of gastric malignancy in his publications. Ruddock proposed a combination of gastroscopy and peritoneoscopy to examine the stomach for malignancy. While observing the stomach surface through a peritoneoscope, the physician introduced a "special stomach tube" (Rehfuss tube) per os into the stomach (**Figure 4**). This instrument was outfitted with an electric light at the tip to transilluminate the stomach wall. In order to make the examination more effective, Ruddock distended the stomach with air.<sup>8</sup>



◀ **Figure 4.**  
Transillumination of inflated stomach (Ruddock, 1937).  
Figure 3-7 in *Highlights in the History of Laparoscopy*.



**Figure 6. John C. Ruddock.**  
In July 1944, Ruddock became head of medical service at the naval hospital in San Diego. Figure 3-11 in *Highlights in the History of Laparoscopy*.

◀ **Figure 5. Heinz Kalk.**  
Between 1939 and 1945, Kalk was working for the medical services of the Luftwaffe, the German air force. Figure 3-14 in *Highlights in the History of Laparoscopy*.



In the late 1930s and early 1940s, many North American physicians not only embraced Ruddock's technique, but contributed their own refinements to the procedure. Robert Hope, who assisted Ruddock for three years, examined the use of peritoneoscopy for diagnosing extra-uterine pregnancy.<sup>9</sup> Edward Benedict of Boston described the aspiration of an ovarian cyst under peritoneoscopic view.<sup>10</sup> William Lee of Philadelphia performed cholecystography under peritoneoscopic examination.<sup>11</sup> Robinson and Fiske of Santa Barbara, California, presented a retractor for displacing viscera during peritoneoscopic examination.<sup>12</sup> "Peritoneoscopy has received much more attention during the past year than ever before," summarized Beling in 1941.<sup>13</sup>

## World War II. Epidemic Hepatitis and Laparoscopic Biopsy

At the Berlin-Friedrichshain Hospital, Kalk concentrated most of his efforts on liver disease and laparoscopy during the 1930s, performing more and more laparoscopic examinations. By 1942 Kalk had carried out 750 diagnostic laparoscopies. Also during this period, Kalk began to experiment with laparoscopic biopsy, first with enlarged spleens (1934), and then with the liver (1935).<sup>14</sup>

With the Nazi attack on the Soviet Union in 1941, German troops began to contract hepatitis in large numbers. The spread of epidemic hepatitis among German soldiers caused Kalk to take a serious look at liver biopsy. The high fatality rate of blind liver biopsy, then standard practice, convinced Kalk to turn to laparoscopic biopsy. In 1942 and 1943, Kalk perfected the technique of laparoscopic liver biopsy and introduced the procedure in military hospitals throughout German-occupied Europe (**Figure 5**).<sup>15</sup> Kalk published a report in 1943 on 123 liver biopsies performed under laparoscopic control.<sup>16</sup> After the war, Kalk's achievements in laparoscopy and hepatology won recognition in other European countries. Because of his persistence and dedication for more than 30 years, laparoscopy became an accepted tool in the diagnosis of liver disease.

## Postwar Era

In July 1946, Ruddock left the US naval hospital in San Diego, where he had served during the second world war, to return to private practice in Los Angeles (**Figure 6**). In his first post-war publication (1949), Ruddock presented statistical data from 1,500 cases from a total of 2,500 cases of peritoneoscopy.<sup>17</sup> Eight years later, when Ruddock had already retired, he concluded that errors of clinical diagnosis in abdominal disease could reach 48 percent as compared to an error rate of 6 percent when abdominal endoscopy was employed.<sup>18</sup>

In 1966, two years after Ruddock's death, Gerald W. Parker and Anton L. Hitzelberger of Washington analyzed data collected in a survey of 1,200 physicians in the United States (600 internists and 600 surgeons).<sup>19</sup> They stated "Less than 10 percent had ever performed peritoneoscopy and less than 1 percent had performed more than 50 procedures." It may be that their findings were due to the fact that most of Ruddock's articles were published in surgical journals; a significant number of those who used his technique were surgeons. After a brief stir, it seems that most surgeons abandoned peritoneoscopy because of its limited therapeutic applications.

On the other hand, Kalk's audience in Germany was composed largely of internists. His work on laparoscopic biopsy and epidemic hepatitis provoked a great deal of interest

and led to the increased use of laparoscopy in Europe. Kalk published his work on liver disease and laparoscopy in more than 350 articles and eight books. Hundreds of physicians visited Kalk's clinic. Many stayed for weeks and longer to learn the technique properly.<sup>2</sup>

## Separate Paths of Development

Kalk and Ruddock overcame the technological limitations of the 1920s to create usable instruments with a graded optical system. They were also able to determine clear indications and contraindications for laparoscopy. Although very similar in appearance, the development of laparoscopic instruments and investigatory methods took different paths in Europe and the United States. The reasons for this are three-fold:

### 1. Political situation.

After Adolf Hitler came to power in January 1933, thousands of people were forced to flee Germany during consolidation of the Nazi regimen. The National Socialists simultaneously pursued a threatening and destabilizing external foreign policy to their neighbors. These political actions and their implications created a reluctance among American physicians to cite the German medical press. For its part, fascist Germany was hostile to a discussion of the experiences and successes of American medicine.

### 2. Difficulties in trans-Atlantic communication.

Between the World Wars, physicians in Europe and the United States faced a journey of several weeks in order to meet with colleagues on the other side of the ocean.

In Ruddock's case, except for military service in France during World War I, there is no evidence that he ever visited Europe again.

### 3. Antagonism between surgeons and internists.

Most laparoscopists in Europe were internists; their North American colleagues, on the other hand, were typically surgeons. Ruddock, an internist, published in the surgical journals. In the 1930s, neither surgeons nor internists were particularly open to the idea of reciprocal scholarly exchange.

## CONCLUSION

The spread of Kalk's laparoscopy in Europe and the history of Ruddock's peritoneoscopy in the United States paint a clear picture of how similar concepts, techniques, and instruments can develop differently in separate settings. While laparoscopic methods attracted more attention and supporters in Europe, its progress almost came to a halt in the United States.

A final irony in the puzzling development of laparoscopy during this period is that the two main figures most likely did not have any knowledge of one another. As described above, a number of social, political, historical, geographical and personal factors conspired to prevent their ever meeting and exchanging ideas.

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